

Application No.: 10/606,100
Amendment Dated: January 4, 2008
Office Action dated February 27, 2006
Attorney Docket No.: 2233.001

Remarks/Arguments

Claims 1-9 are pending in the application. Claims 1 and 6 are in independent form.

Claim Rejections – 35 U.S.C. § 112

Claims 1 - 9 stand rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants submit that several of the items indicated to be indefinite are actually unambiguous and perfectly clear. MPEP 2173.05(e) states: "Obviously, however, the failure to provide explicit antecedent basis for terms does not always render a claim indefinite. If the scope of a claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite. >*Energizer Holdings Inc. v. Int'l Trade Comm'n*, 435 F.3d 1366, 77 USPQ2d 1625 (Fed. Cir. 2006)(holding that "anode gel" provided by implication the antecedent basis for "zinc anode"); < *Ex parte Porter*, 25 USPQ2d 1144, 1145 (Bd. Pat. App. & Inter. 1992) ("controlled stream of fluid" provided reasonable antecedent basis for "the controlled fluid"). Inherent components of elements recited have antecedent basis in the recitation of the components themselves. For example, the limitation "the outer surface of said sphere" would not require an antecedent recitation that the sphere has an outer surface. See *Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 1359, 61 USPQ2d 1216, 1218-19 (Fed. Cir 2001) (holding that recitation of "an ellipse" provided antecedent basis for "an ellipse having a major diameter" because "[t]here can be no dispute that mathematically an inherent characteristic of an ellipse is a major diameter")."

The Examiner states that claim 1 is unclear because "the candidate markers" in line 12 could refer to either the first or the second set of candidate markers. Line 12 states: "the candidate markers in the second set." Applicants submit that because the claim expressly qualifies the candidate markers with the qualifier "in the second set," there is no ambiguity. With regard to line 14, lines 12 and 13 state "projecting the candidate markers in the second set onto a sole image" and then line 14 refers to "the candidate markers in the sole image." Applicants submit that there is no ambiguity in the phrase "the candidate markers in the sole

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image” because the previous element states that the second set of candidate markers are projected onto the sole image.

The Examiner states that the “identified candidate markers” in line 15 is unclear. Amended claim 1 states: “to identify a third subset of candidate markers” and then “aligning the images in the tilt series on the basis of the third subset of identified candidate markers”

Amended claim 6 replaces “the coordinates” in line 3 with “coordinate.”

Amended claim 6 states “deriving for each candidate marker in the second set” to clarify that the candidate markers are those in the second set. Applicant submits that the later reference to the “corresponding candidate marker” clearly relates to the just described “each of the candidate markers in the second set.”

In claim 6, “the relation” and “the line distance parameter” are amended to state “a relation” and “a line distance parameter.”

Regarding “the histogram” in claim 7, applicants assume the Examiner meant claim 6. Applicants submit that there is no ambiguity in claim 6, line 11, which states “identifying the histogram corresponding to said minimum value.” It is clear that “the histogram” is the one corresponding to the minimum value.

Claim Rejections – 35 U.S.C. § 102

Claims 1, 4, and 5 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Brandt et al., “Automatic Alignment of Electron Tomography Images Using Markers”, Intelligent Robots and Computer Vision XIX, SPIE Preceding Series, Nov. 2000 (“Brandt”).

Claim 1 states: “applying a fitting algorithm to determine a set of parallel straight lines or very elongate ellipses best fitting the candidate markers in the sole image to identify a third subset of candidate markers.” The Examiner states that Brandt teaches “applying a fitting algorithm to determine a set of parallel straight lines (FIG. 6) or very elongate ellipses best fitting the candidate markers in the sole image (5. Marker matching and Tracking).”

Applicants submit that Brandt does not teach “applying a fitting algorithm to determine a set of parallel straight lines or very elongate ellipses best fitting the candidate markers in the sole image to identify a third subset of candidate markers.” Brandt locates a marker and then determines candidates that may be same marker in successive images. Because “the beads look

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similar to each other," Brandt uses graphs of a bead and its nearest neighbors and then tries to find the graphs on successive images. As is clear from FIG. 3, Brandt uses the term "graph" in the mathematical sense as "a collection of vertices or 'nodes' and a collection of edges that connect pairs of vertices." http://en.wikipedia.org/wiki/Graph_theory. A graph, as shown in FIG. 3a, is more unique than a single bead, and so reduces the number of false matches to a workable level. The number of false matches is further reduced by using epipolar geometry. Brandt uses epipolar geometry not to fit a line to observed points, but to calculate a theoretical region where a point should be in the subsequent image after the stage is tilted. A point that is not in the region is not likely to be the same marker as the one in the first image. Thus, rather than fitting a line to two points, Brandt uses epipolar geometry to determine whether a second point is a "false positive."

FIG. 6, indicated by the Examiner, shows the "found gold markers." The lines in FIG. 6 do not represent "applying a fitting algorithm to determine a set of parallel straight lines or very elongate ellipses best fitting the candidate markers in the sole image to identify a third subset of candidate markers."

Applicants submit that claims 4 and 5 are patentable for at least the reasons described above with respect to claim 1.

Claim Rejections – 35 U.S.C. § 103

Claim 2 stands rejected under 35 U.S.C. § 103(a) for obviousness over Brandt in view of Russ, The Image Processing Handbook, CRC press, 1994, pages 495-500. ("Russ")

Applicants submit that claim 2 is patentable for the reason described above with respect to claim 1. Moreover, the Examiner states that it would have been obvious to use the Hough transformation because it minimizes deviations of points from the line in a direction to the line and it deals correctly with the case of the point not being uniformly distributed along the line. Applicants submit that Brandt teaches identifying markers using graph theory together with epipolar geometry to identify pairwise markers in subsequent images. Because Brandt does not use "a fitting algorithm to determine a set of parallel straight lines or very elongate ellipses best fitting the candidate markers in the sole image to identify a third subset of candidate markers," there is no reason to combine the Hough transformation of Russ.

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That is, while the Examiner points out general benefits of the Hough transformation, there is no suggestion that such benefits would be useful in aligning a tilt series of images using markers.

Claim 3 stands rejected under 35 U.S.C. § 103(a) for obviousness over Brandt in view of Ballard, "Generalizing The Hough Transform to Detect Arbitrary Shapes, Pattern Recognition, Vol 13, No 2, page 111-122, (1981) ("Ballard").

Applicants submit that claim 3, 7, 8, and 9 are patentable for the reason described above with respect to claim 1 and claim 2.

Claim 6 is not rejected over the prior art and applicants assume that the Examiner considered claim 6 to be patentable if rewritten into independent form amended to overcome the rejections under 35 USC 112.

Applicants submit that the claims are patentable and respectfully request reconsideration and allowance.

Very truly yours,

Date: 1/4/08

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